California Department of Water Resources
Oroville Division, State Water Facilities
FERC Project No. 2100

Modeling Protocols

I. Introduction and Purpose

On January 28, 2002, the Plenary Group formed a taskforce to address concerns related to model development, analyses, and reporting for the Oroville FERC relicensing. The Task Force was directed to develop a general approach to model review that would ensure transparency and credibility in model use and instill confidence among the various collaborative participants that models used are appropriate to the task at hand. This protocol could then be used to review and report on any model under consideration for the Oroville Facilities Relicensing process.

In addition to the directive of the Plenary Group, the Engineering and Operations Work Group has identified the need for protocols to address how modeling studies would be conducted.

II. Criteria for evaluating models

Development of specific and quantifiable criteria has been difficult. However, Plenary Task Force has agreed upon the following objectives that are to be used to evaluate models used in this proceeding.

- Model results should have utility. That is, data produced by models should be useful in creating information to support work group studies and decision making
- Model results should be reliable. The issue is whether the model accurately predicts the consequences of operational scenarios being studied.
- Models should be flexible. It is important the models can readily evaluate alternative operational scenarios.
- Model results should provide data that are superior to those derived from alternative analytic methods.
- Models should integrate with each other. No single model can provide data to analyze all of the conditions being investigated. Therefore, the suite of models that will be used must be capable of passing data and information among them.
- The model review process must be transparent to the relicensing participants. The concept of transparency is intended to mean that participants are assured the review process is honest and that model

biases and limitations will be identified so they may be factored into the information that is produced by modeling analyses. This includes distinguishing between policy and technical-based modeling assumptions.

III. Process for Documenting Models

The Plenary Modeling Task Force will be responsible for documenting models as described below. In order to accomplish this task, the Task Force may request assistance from technical experts from other work groups, agencies and stakeholders participating in the FERC relicensing effort for the Oroville Complex. The Task Force will provide a document including the following:

1. A list of the models to be reviewed. The Task Force has agreed that not every model or modeling tool must be reviewed.

2. A short summary for each model on the list will be developed and distributed to the Plenary Group. Each summary will contain:
   - Description of the model capabilities and what analyses the model will be used for.
   - Model limitations. Models are merely abstractions of reality and, therefore, have limitations as to their abilities to simulate prototype actions.
   - Assumptions used in the model and flexibility provided. These assumptions are to be separated into technical and policy assumptions.
   - Appraisal by the Task Force regarding confidence in model's ability to meet the criteria listed above.

3. A description of model interactions.

IV. Process to Resolve Issues Related to Model Review

The Task Force recognizes that in some circumstances, it may be necessary to bring issues that cannot be resolved at the model review team level back to the Plenary Group for consideration. The following are process for initiating such outside review.

1. Frame the issue. The goal is to clearly define the issue and the expected action by the Plenary (i.e. feedback vs. resolution of a policy-related issue).

2. Identify potential resolution of the issue. There may be one or more alternatives that have been discussed or considered by the Task

Force. Report to the Plenary on the issue and solicit input or direction to initiate outside assistance.

3. Identify other parties that could provide input on the issue. In some cases, this could result in assistance from third parties to review modeling approaches.

4. Present a report to the Plenary on the issue.

V. Process for Performing Modeling Analyses

The Department of Water Resources' Oroville Facilities Relicensing Study Plan SP-E2 outlines the process for cooperatively developing operations model run requests. DWR staff and its consultants will work in conjunction to ensure model run results meet Federal Energy Regulatory Commission requirements for preparing and filing a complete, satisfactory, and successful license application by January 31, 2005. To facilitate implementation of Study Plan SP-E2, this protocol establishes (1) a modeling coordinator and (2) a process for developing modeling analyses. Although this study plan was intended to address operations models only, the process listed below will be applied to modeling analyses performed by the various resource Work Groups.

Modeling Coordinator: All operations model runs will be directed, managed, and performed under the direction of DWR's Operations Modeling Coordinator. Modeling activities originating within other resource area work groups will be directed, managed and performed under the direction of a Resource Area Modeling Coordinator. The Modeling Coordinator's main objective is to coordinate modeling analyses requests to ensure an efficient modeling process exists to obtain information to complete the studies. The Operations Modeling Coordinator will direct the modeling tasks that are performed by the Department's Operations Modeling Team. This team is comprised of Department and consultant staff. Specific resource Work Groups will perform modeling under the coordination of a Resource Area Modeling Coordinator; the Operations Modeling Coordinator will work with these Resource Area Coordinators to ensure proper coordination with the Operations Modeling Team.

The Operations Modeling Coordinator will oversee and direct the following activities:

- Establish an operations modeling group comprised of DWR and consultants
- Develop criteria for operations model runs

- Prioritize operations model runs
- Coordinate across studies for consistency
- Assure efficiency
- Define format and presentation of operations model run output for Work Group studies
- Provide regular status report to RAMS and Plenary Group
- Coordinate Operations Modeling with other modeling activities

Modeling Analyses Process: The Operations Modeling Coordinator will work with resource Work Groups and the Plenary Group, to develop and implement appropriate modeling analyses. The steps include:

1. Request Model Runs: In order to manage and track the modeling activities, the resource Work Group model run requests will be transmitted to the Modeling Coordinator via the appropriate relicensing Resource Area Manager (RAM). Requests from the Plenary Group may be transmitted through the relicensing Program Manager.

2. Define a Modeling Plan: The Modeling Coordinator (and appropriate Modeling Team staff) will work with Work Group participants and the corresponding RAM to determine the information and analyses required to complete their studies (i.e., reservoir levels, temperature data, flow data, etc). The Modeling Coordinator will work cooperatively with each RAM and work group to develop a set of model runs that can meet the needs of all of their study plans. The objective of this collaboration is to aggregate requests when appropriate to maximize the usefulness of each model run, and to ensure that the modeling will be consistent among data results and analyses. The Modeling Coordinator will identify and address circumstances that challenge[1] the resources available for conducting modeling analyses. The result of this task will be a written plan that includes:

   - The purpose of the modeling analyses being requested and the information desired.
   - The information that will be produced by the modeling analyses and the limitations on use of the information. Due to the high degree of coordination with study plan authors, the information produced should be the same as the information desired. There may be cases when this is not possible. In those cases, documentation will be provided to explain why the information provided will not be the same as the information desired.
   - The models to be used for the analyses, as well as how those models interact.
   - The assumptions used for each model and model run.

[1] Such challenges would include circumstances when the requests for modeling analyses exceed the capability of available resources.

3. Approve and Prioritize Modeling Plans: Approval of modeling plans will consider the efficient use of available resources, the need for the modeling analyses, and the relationship to relicensing. As part of the model plan development process, the Modeling Coordinator will prioritize the approved set of model runs. A regular modeling status report will be provided to the RAMs and at the scheduled Plenary Group meetings.

4. Conflict Resolution: Development of the modeling plans is a collaborative activity that includes the Modeling Coordinator, Modeling Team staff, study plan authors, work group participants as well as the RAMs. Few if any conflicts regarding need for specific model runs or the priority placed on the model runs are expected. However, if a conflict is identified and cannot be resolved between the Modeling Coordinator and the RAMs, the issue will be resolved in accordance with Section IV of the Process Protocols, dated May 1, 2001. Concurrent with any issue resolution matters, DWR will present its approach for keeping the relicensing process on schedule while the issue is being resolved.